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Diapetimorpha introita (Hymenoptera: Ichneumonidae), a native ectoparasitoid of *Spodoptera* spp. pupae was reared in the laboratory on an artificial diet devoid of any insect host components. Diet-reared wasps demonstrated a propensity to search for and parasitize natural hosts in a field cage trial. Longevity of the diet-reared wasps was comparable with the longevity of wasps reared on host pupae. Survival rate of *D. introita* was 67.3% when reared on diet and 76.3% when reared on host pupae. Developmental time was significantly longer for wasps reared on the artificial diet than for wasps reared on host pupae. Reduced fecundity and reduced wasp weight were characteristics of diet-reared *D. introita*. Efforts to improve wasp weight, developmental time, fecundity and longevity have included the use of culture media conditioned by insect cell lines, additional nutrients in the diet, and diets supplemented with lipid extracts from host pupae. These efforts resulted in some improvement in wasp weight and fecundity. Other studies comparing molting hormone titers of diet-reared and host-reared *D. introita* were undertaken to elucidate factors responsible for the reduced emergence of diet-reared wasps. After the initiation of cocooning, there were six stages of development in which hemolymph ecdysteroid titers were significantly higher in host-reared than diet-reared wasps. Thus, insufficient ecdysteroid in the hemolymph during metamorphosis may contribute to the higher percentage mortality that occurred in wasps reared on the artificial diet. Because the wasps can be reared on the artificial diet without any exposure to host kairomones, we investigated the role of preimaginal and imaginal exposure to host kairomones on the acceptance and preference of different host species. We found that rearing *D. introita* on artificial diet (in the absence of host kairomones) did not significantly influence female oviposition response in choosing a preferred host. Also, our results indicate that there is limited opportunity to manipulate the host preference of *D. introita* by preimaginal or imaginal exposure to host or non-host kairomones.

Index terms: *Diapetimorpha introita*, *Spodoptera*, *in vitro* rearing, kairomone, entomophagous